Original Article

Indications and Outcomes of Intraocular Lens Exchange in a Cohort of Pseudophakic Iranian Patients

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Abstract

Purpose: To investigate the indications and outcomes of intraocular lens (IOL) exchange surgery in a cohort of pseudophakic Iranian patients.
Patients and Methods: This retrospective cross-sectional study evaluated the indications and outcome of IOL exchange surgery among pseudophakic Iranian patients. The study included adult patients (age > 18 years) who underwent IOL exchange surgery at Torfeh and Imam Hussein Hospitals, Tehran, Iran, from April 2020 to April 2021. Post-surgical metrics such as best-corrected visual acuity (BCVA), uncorrected visual acuity (UCVA), and intraocular pressure (IOP) were extracted from the medical files.
Results: The study encompassed 36 eyes from 36 patients. The mean age of the patients was 47.3 ± 11.1 years. The most common indication for IOL exchange was lens dislocation, observed in 26 patients (72.2 %), followed by IOL-induced uveitis-glaucoma-hyphema syndrome in 6 patients (16.7 %), unexpected IOL power ("IOL surprise") in 3 patients (8.3 %), and calcified IOL in 1 patient (2.8 %). There was a significant postoperative improvement in the mean UCVA and BCVA (Pvalue < 0.001 for both) compared to pre-surgical readings. The mean IOP before IOL exchange was 16.30 ± 3.89 mmHg, which decreased to 15.05 ± 4.32 mmHg after lens exchange; however, this improvement was not statistically significant (P = 0.42).
Conclusion: Consistent with prior studies, the most prevalent reason for IOL exchange among our patients was IOL dislocation. Our study also indicates an improvement in visual acuity post-surgery, in line with other research findings.

Keywords: Indications; Surgical Outcomes; Pseudophakia; Intraocular Lens Exchange; Iran.

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Introduction

According to the latest evaluations, cataract is the cause of 51 % of global blindness [1].

Over the past few decades, cataract surgery techniques have undergone significant changes, evolving from intracapsular surgery to extracapsular surgery, then to phacoemulsification, and more recently, femtosecond laser-assisted cataract surgery (FLACS) [2]. Intraocular lenses (IOLs) represent a revolutionary breakthrough in cataract surgery. The introduction of IOLs dates back to 1949 when Harold Ridley successfully implanted the first one [3]. While the initial performance of these IOLs was relatively suboptimal, subsequent design improvements led to their successful adoption in ophthalmic clinics since the mid-1960s [3]. Currently, IOL implantation is considered the standard method for restoring vision after cataract surgery [3, 4].

IOLs are broadly categorized into two main types. Anterior chamber IOLs (AC IOLs), or lenses in the front chamber of the eye, which can be angle-supported or iris-fixated, depending on whether the haptic is placed in the angle of the eye or fixed to the iris [5]. The other type is posterior chamber IOLs (PC IOLs), or lenses in the back chamber of the eye. These lenses can be placed in various locations, including behind the iris with haptics in the ciliary sulcus, in the capsular bag, or even fixated to the sclera [5]. Advanced types of intraocular lenses, such as multifocal IOLs, toric IOLs, extended depth of focus (EDOF) IOLs, and adjustable IOLs, offer precise and comfortable refractive outcomes following cataract surgery [5]. However, achieving the ideal refractive status after cataract surgery is not always straightforward, especially for patients who have undergone previous refractive surgeries before developing cataracts [6-9].

Although cataract surgery is considered one of the safest surgical procedures with minimal complications, the substantial number of people undergoing this surgery means that even rare post-cataract surgery complications can have a significant impact on society [10]. The prevalence and incidence of post-cataract surgery complications vary between different studies based on the techniques and protocols used and the surgeon's experience. Posterior capsule opacification (PCO). IOL dislocation, pseudophakic corneal edema, dropped nucleus, retinal detachment, endophthalmitis following surgery, pseudophakic corneal edema, and postoperative wound dehiscence are some of the most common complications after cataract surgery [2].

The need for IOL exchange after cataract surgery is a rare but serious complication. Despite advancements in cataract surgery in recent decades leading to a reduction in IOL exchange procedures, this surgery remains a significant procedure in the field of ophthalmology [11]. There are few comprehensive studies investigating the outcomes of IOL exchange surgery for the treatment of cataracts in Iran [12]. Thus, we aimed to investigate the indications and outcomes of IOL exchange surgery in a large cohort of Iranian patients.

Patients and Methods

This was a retrospective cross-sectional study to evaluate the indications and outcomes of IOL exchange surgery in a cohort of pseudophakic Iranian patients. It was conducted on adult patients (age > 18 years) who underwent IOL exchange surgery at Torfeh and Imam Hussein Hospitals, Tehran, Iran, from April 2020 to April 2021. The study protocol was approved by the ethics committee of Shahid Beheshti University of Medical Sciences, and the

requirement for patient consent was waived by the ethics committee.

The sampling method used in this study was convenience sampling/file review, given the availability of medical records. Patients were excluded from the study if the time interval between cataract surgery and IOL exchange surgery was less than one month. Also, patients were excluded if their medical records were incomplete. The medical records of all patients, including demographic information (age, gender), chief complaint, history of ocular diseases, type of primary IOL, the indication for IOL exchange, uncorrected visual acuity (UCVA), and best-corrected visual acuity (BCVA) before and after surgery, intraocular pressure (IOP) before and after surgery, as well as complications, were recorded. The post-surgical readings for BCVA, UCVA, and IOP extracted from the medical files of patients were recorded at least three months post-surgery.

Statistical analysis

To describe the data, measures such as mean, standard deviation, range, frequency, and percentage were utilized. For comparing the means of variables, paired t-test was employed. All analyses were conducted using SPSS 25.0 statistical software (Armonk, NY: IBM Corp). In these analyses, a P-value of less than 0.05 was considered to indicate statistical significance.

Results

The medical records of 36 eyes from 36 patients eligible for IOL exchange surgery were included in the study. The mean age of the patients was 47.3 ± 11.1 years, ranging from 27 to 80 years. Of these, 22 patients (61.1 %) were male, and 14 patients (38.9 %) were female. A total of 29 patients (80.5 %) had complaints of reduced and/or blurred vision, 1 patient (2.8 %) had corneal pathology, and 6 patients (16.7 %) had high IOP. The past medical history of the patients was also evaluated, revealing a history of hypertension in 10 patients (27.8 %) and diabetes mellitus (DM) in 2 patients (5.6 %). Patients' demographic information is presented in table 1.

Table 2 displays the different types of IOLs used in the primary cataract surgeries and the IOL exchange surgeries. In the primary cataract surgeries, 22 enVista lenses (61.1 %), 7 PMMA lenses (19.4 %), and 7 Alcon lenses (19.5 %) were utilized. During the IOL exchange surgeries, 3 Alcon three-piece lenses (8.4 %) and 33 Artisan-Ophtec lenses (91.6 %) were used.

Table 3 presents the indications for IOL exchange surgeries. The most common cause necessitating IOL exchange was a dislocated lens, observed in 26 patients (72.2 %). This was followed by IOL-induced Uveitis-Glaucoma-Hyphema (UGH) Syndrome in 6 patients (16.7 %), unexpected IOL power (‘IOL surprise’) in 3 patients (8.3 %), and calcified IOL in 1 patient (2.8 %).

Table 4 presents a comparison of the mean UCVA and BCVA before and after lens exchange. A significant improvement in both UCVA and BCVA was observed (P value < 0.001 for each). In our study, the mean interval from the initial surgery to the IOL exchange surgery was 42 ± 39 months.

The mean intraocular pressure (IOP) before lens exchange was 16.30 ± 3.89 mmHg, which decreased to 15.05 ± 4.32 mmHg after lens exchange. However, this improvement was not statistically significant (P = 0.42).

The assessment of post-operative complications following the secondary surgery revealed that

Table 1: Demographic findings of patients entering the study

Variable	Categories	N (%)
Gender	Male	22 (61.1 %)
	Female	14 (38.9 %)
Patient's CC	Blurred vision	29 (80.5 %)
	Corneal edema	1 (2.8 %)
	Ocular pain	6 (16.7 %)
Past medical HX	Other	2 (5.6 %)
	DM	3 (8.3 %)
	DM, HTN	2 (5.6 %)
	HTN	10 (27.8 %)
	IHD	3 (8.3 %)
	No medical history	16 (44.4 %)
Past eye surgical HX	No surgical history	0 (0 %)
	Yes	36 (100 %)
Drug HX	No	22 (61.1 %)
	Yes	14 (38.9 %)
Laterality	OD	23 (63.9 %)
	OS	13 (36.1 %)

DM: Diabetes Mellitus; HTN: Hypertension; IHD: Ischemic Heart Disease; HX: History; CC:Chief Complaint

Table 2: The distribution of lenses used in the primary cataract surgery and the lens exchange surgery

Surgical Procedure	IOL Type	Number	Percentage
Primary Cataract Surgery	enVista	22	(61.1 %)
	PMMA	7	(19.4 %)
	Alcon	5	(19.5 %)
IOL Exchange Surgery	Alcon three- piece	3	(8.4 %)
	Artisan-Ophtec	33	(91.6 %)

IOL: Intra Ocular Lens

Table 3: The cause of IOL exchange surgery among patients entering the study

Cause of IOL exchange		Number	Percentage
IOL Pathology	Dislocated IOL	26	(72.2 %)
	Calcified IOL	1	(2.8 %)
	IOL Induced UGH	6	(16.7 %)
	IOL Surprise	3	(8.3 %)

IOL: Intra Ocular Lens; UGH: Uveitis-Glaucoma-Hyphema Syndrome

Table 4: Comparison of the mean UCVA and BCVA before and after lens exchange

Variable	Pre	Post	P Value*
UCVA (LogMAR)	0.94 ± 0.52	0.51 ± 0.29	< 0.001
BCVA (LogMAR)	0.84 ± 0.62	0.47 ± 0.45	< 0.001

* Based on paired t-test

2 patients (7.6 %) experienced IOL dislocation as a complication, while the others were free from post-operative complications.

Discussion

In the present study, we investigated the indications and outcomes of IOL exchange surgery in a cohort of Iranian patients. We observed that IOL dislocation (72.2 %) was the main cause of IOL exchange surgery among our patients. Similar to our findings, a study by Lorente et al.,[13] determined that IOL dislocation was the most common indication for IOL exchange. Likewise, Jason et al., [14] reported that IOL dislocation was the most frequent indication for IOL exchange among their patients (46 % of patients). In another study by Oltulu et al., [15] dislocation and decentration were the most common indications for IOL exchange in Turkey. The results of a study by Davis et al., [16] showed that dislocation was the most common reason for lens exchange among patients in Spain. In our study, after dislocation, IOL surprise accounted for 8.3 % of cases, and calcified IOL was observed in only one patient.

We also compared the average BCVA and UCVA before and after lens exchange surgery. We observed a statistically significant improvement in UCVA and BCVA. Similar to our results, many previous studies have reported post-surgical improvement in visual acuity among their patients [15-19]. In contrast, Jirásková et al., [20] found no statistically significant improvement in visual acuity before and after IOL exchange, which might be attributed to their low sample size of just 23 eyes.

In our study, the mean interval time from initial surgery to IOL exchange surgery was 42 ± 39 months. This result is comparable with the results reported by N. Jirásková et al., [20], who reported a mean interval of 46 months.

Our study also examined changes in intraocular pressure (IOP) before and after lens exchange surgery. We found a reduction in mean IOP from 16.30 ± 3.89 mmHg before surgery

to 15.05 ± 4.32 mmHg after IOL exchange surgery, but this reduction was not statistically significant. De Roja et al., in their study involving 134 patients, reported a significant reduction in mean IOP from 16.78 ± 4.49 mmHg to 15.53 ± 3.476 mmHg, respectively (P = 0.005). The difference in the significance of IOP reduction seems to be the result of our small sample size of just 36 patients.

The assessment of post-operative complications after IOL exchange showed that only 2 patients (7.6 %) experienced IOL dislocation. Due to the increased use of 3-piece and Artisan lenses in IOL exchange surgeries, it can be argued that these lenses cause fewer complications. However, further extensive and complementary studies are needed to confirm this finding.

Our study had some limitations, including the relatively small sample size and short follow-up period. Further prospective multicenter studies with larger sample sizes are recommended to better evaluate the long-term outcomes of IOL exchange surgery among Iranian patients.

Conclusion

Consistent with prior studies, the most prevalent reason for IOL exchange among our patients was IOL dislocation. Our study also indicates an improvement in visual acuity post-surgery, in line with other research findings.

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Footnotes and Financial Disclosures

Conflict of interest:

The authors have no conflict of interest with the subject matter of the present manuscript.